भारतीय मानक
Indian Standard

IS 17813 : 2022

भवनों में (बाहरी एवं आंतरिक) 5 किग्रा/सेमी² (5 बार) तक ऑपरेटिंग प्रैशर सहित मल्टी लेयर (पोलीइथीलीन-स्टेनलैस स्टील) स्टेनलैस स्टील नम्य नालीदार गैस टयूबिंग किट — विशिष्टि

Multi Layer (Polyethylene-Stainless Steel) Stainless Steel Pliable Corrugated Gas Tubing Kits in Buildings (Indoor and Outdoor) with an Operating Pressure up to 5 kg/cm² (5 bar) — Specification

ICS 23.040.70

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March 2022 **Price Group 8**

Domestic and Commercial Gas Burning Appliances Sectional Committee, MED 23

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on the recommendation of the Domestic and Commerical Gas Burning Appliances (Pressure Type) Sectional Committee, and approved by the Mechanical Engineering Division Council.

The standard specifies the requirements for material, design, manufacture, testing marking, documentation and fabrication of stainless steel pliable corrugated gas tubing (PLGT) for the distribution of gases in high raised residential flats/apartments, residential houses, commercial and industrial gas installations with a maximum operating pressure (MOP) up to 5 kg/cm^2 (5 bar).

The relevant SI units and corresponding conversion factors are given below for guidance:

Pressure 1Pa (Pascal) = 1 N/m^2
1 kgf/mm^2 = 9.806 65 MPa

The composition of the Committee responsible for the formulation of this standard is given in Annex M.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

MULTI LAYER (POLYETHYLENE-STAINLESS STEEL) STAINLESS STEEL PLIABLE CORRUGATED GAS TUBING KITS IN BUILDINGS (INDOOR AND OUTDOOR) WITH AN OPERATING PRESSURE UP TO 5 kg/cm² (5 BAR) — SPECIFICATION

1 SCOPE

The standard specifies the requirements for material, design, manufacture, testing marking, documentation and fabrication of stainless steel pliable corrugated gas tubing (PLGT) for the distribution of gases in high raised residential flats/apartments, residential houses, commercial and industrial gas installations with a maximum operating pressure (MOP) up to 5 kg/cm^2 (5 bar).

2 REFERENCES

The standard listed below contain provision which, through reference in this text, constitute provision of this standard. At the time of publication, edition was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate of applying the most recent edition of the standard indicated below:

IS No	*Title*
319 : 2007	Free cutting brass bars, rods and section — Specification (*fifth revision*)
554 : 1999	Pipe threads where pressure-tight joints are made on the threads — Dimensions, tolerances and designation (*fourth revision*)
2305 : 1988	Method for mercurous nitrate test for copper and copper alloys (*first revision*)
6911 : 2017	Stainless steel plate, sheet and strip — Specification (*second revision*)
7328 : 2020	Specification for polyethylene material for moulding and extrusion (*third revision*)
11149 : 1984	Specification for rubber gaskets
14885 : 2001	Polyethylene pipes for the supply of gaseous fuels — Specification

3 TERMINOLOGY

For the purpose of this standard, the following terms and definitions shall apply.

3.1 Corrugated Metal Hose — Pressure tight hose made from tube or from strip, with corrugations, helical or annular to the axis of the hose, made by deforming the metal. Its flexibility is obtained by bending the corrugations.

3.2 Nominal Size (DN) — Alphanumeric designation of size comprising the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in mm of the bore or outside diameter.

3.3 Cover — Tubular outer cover intended to protect the PLGT pliable tubing.

3.4 Sleeve — Strip or tube (adhesive, extensile or retractile) added to protect the area between the PLGT fitting and the PLGT pliable tubing cover to prevent the entry of foreign bodies between the tubing and the cover.

3.5 Maximum Operating Pressure (MOP) — Maximum pressure at which a system can be operated continuously under normal conditions (*see* Table 1).

Table 1 Maximum Operating Pressure

(*Clause* 3.5)

Nominal Size (mm)	**Maximum Operating Pressure** (kg/cm²)
DN 10	5
DN 12	5
DN 16	5
DN 20	5
DN 25	5
DN 32	2
DN 40	2
DN 50	2

3.6 Type Testing — Group of test to be performed in order to verify that the performance level of the product meets the requirement.

4 DESIGN REQUIREMENTS

4.1 General

Where additional components are required to complete the PLGT, shall be provided or specified by the manufacturer.

4.2 Materials

The corrugated metal hose shall be manufactured from metals no less durable and robust than stabilized austenitic stainless steel and conforming to IS 6911. The polyethylene materials shall be conformed to IS 7328. End fittings and non-permanently attached parts, whether surface finished or not, shall be manufactured from stainless steel conforming to IS 6911 or from free cutting brass conforming to Grade 1 of IS 319.

4.3 Nominal Size DN and Pressure Drop

The nominal size of PLGT pliable tubing shall be selected from Table 2. The nominal size range shall be from DN 10 to DN 50. The minimum bore size of the pliable tubing shall be at least 98 percent of the nominal size DN.

4.4 PLGT End Fittings

For the purpose of coupling to exiting copper or steel installations PLGT end fittings are:

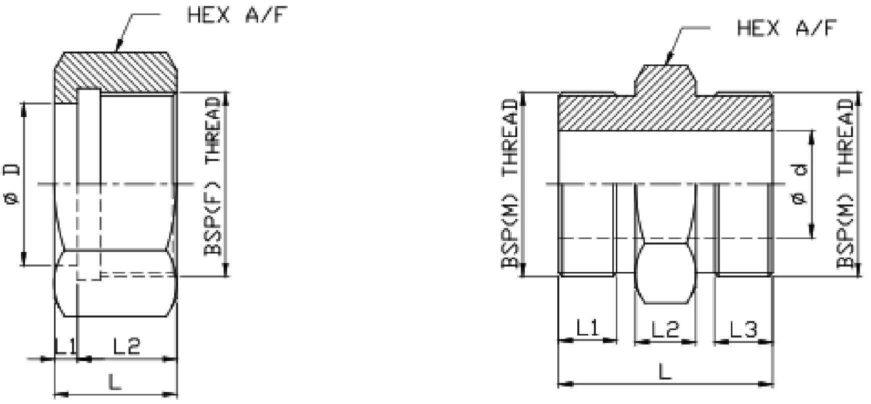
a) A flat seating parallel thread fitting;

b) A conical male (R) or cylindrical female (Rp) fitting;

c) A brazed fitting; and

d) LPG fitting.

Built in threads within the mechanical attachment of the PLGT fittings shall not be compatible with the above connections. *See* Fig.1 for PLGT fittings.



BSP NUT
MATERIAL : BRASS

BSP(M) x BSP(M) ADAPTOR
MATERIAL : BRASS

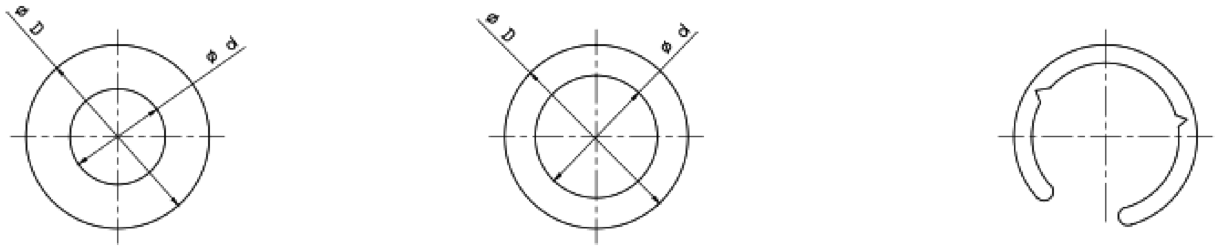


PLATE WASHER
THICKNESS : 2 mm
MATERIAL : SS

FIBER WASHER
THICKNESS : 2 mm
MATERIAL : FIBER

CUT WASHER
THICKNESS : 1.6 mm
MATERIAL : SS

NOTE — Dimensions not given in the above figures shall be arrived suitable by the manufacturer.

FIG. 1 PLGT FITTINGS

4.5 PLGT Fittings

4.5.1 *General*

PLGT fittings shall provide a tight connection to the pliable tubing. PLGT fittings, whether surface finished or not, shall be manufactured from materials prescribed in **4.2**. Copper alloys shall be selected and contain at least 57 percent copper and not more than 3.5 percent lead.

4.5.2 *Manifold and Tees*

4.5.2.1 A PLGT manifold shall be designed to:

a) Connect directly to PLGT tubing by passes so as to limit junctions;
b) Connect the gas feed directly to PLGT tubing;
c) Have an end opposite the gas feed, that is either plugged, or with a direct connection to PLGT tubing; and
d) Be attached so as to withstand the tightening stress from the various PLGT fittings.

4.5.2.2 A PLGT tee shall be designed to:

a) Connect directly to PLGT tubing bypasses so as to limit junctions; and
b) Connect the gas feed directly to PLGT tubing.

4.6 Seals and Sealing Agents

Non-metallic elements assuring leak-tightness between two adjacent elements, be they fixed or movable in respect to each other.

4.7 Environment

PLGT components shall be:

a) resistant to any corrosive agent reasonably foreseen in the conditions of the declared intended use;
b) durable to climatic conditions; and
c) Withstand a temperature range of –20 °C to 60 °C.

4.8 PLGT Supports

Supports shall be made of materials mechanically and chemically non aggressive with the other components of the PLGT with which they are in contact.

4.9 Electrical Conductivity Requirements

PLGT components shall be electrically conductive.

4.10 Cover

The cover shall satisfy the tests. For the purpose of safety, colour of the cover shall be yellow/orange.

Table 2 Nominal Sizes, DN

(*Clause* 4.3)

DN
10
12
15
20
25
32
40
50

5 PERFORMANCE AND TEST REQUIREMENTS

5.1 General

5.1.1 *Introduction*

The number and the type of PLGT samples to be tested, the tests and the compliance criteria shall be in compliance with Table 3.

5.1.1.1 If any nominal size fails one of the tests within the test sequence schedule given in Table 4, then all samples of that nominal size shall be deemed to have failed to meet the type test requirements.

Unless otherwise specified in this standard:

a) All dimensions shall be in mm; and
b) The tests shall be carried out with the cover in place.

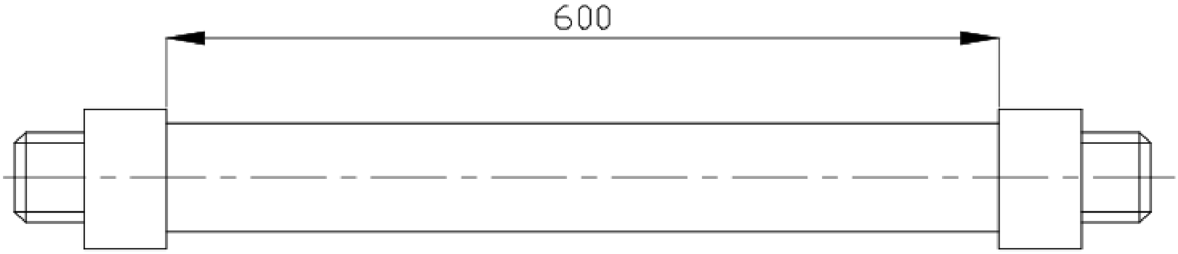
Tests results shall only apply to components of the same design and same material.

5.1.1.2 The tests shall be performed under ambient conditions. If not otherwise indicated, the following tolerances shall apply:

a) Atmospheric pressure : ± 0.750 mm Hg (± 0.1 mbar);
b) Temperature above 125 °C : (± 10) °C;
c) Dimensions : (± 0.1) mm;
d) Air pressure : (± 5) percent;
e) Ambient temperature : (± 1) °C;
f) Duration : (± 5) percent; and
g) Sample length : (– 1/+3) percent.

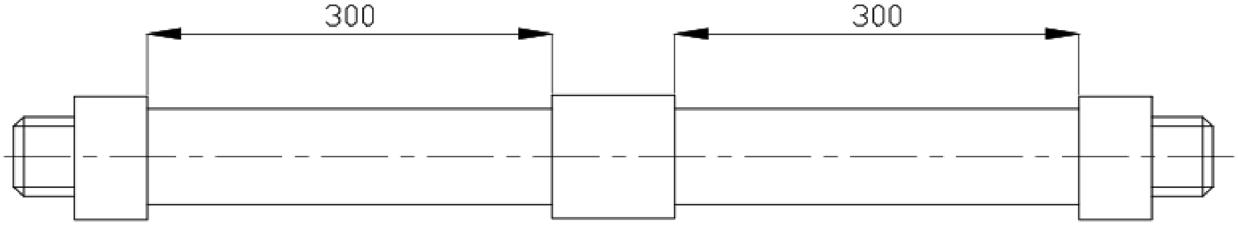
5.1.2 *Type of PLGT Samples*

The PLGT samples used in the following tests shall be assembled in accordance with the manufacturers instructions. Prior to assembling, each length of the pliable tubing shall be tested. Depending on the test, the Type 1 sample (*see* Fig. 2) or Type 2 sample (*see* Fig. 3) shall be used.



All dimensions in millimetres

FIG. 2 PLGT — SAMPLE TYPE 1



All dimensions in millimetres

FIG. 3 PLGT — SAMPLE TYPE 2

Type 1:

PLGT end fitting – PLGT pliable tubing – PLGT end fitting

Type 2 :

PLGT end fitting – PLGT Pliable tubing – PLGT coupling – PLGT pliable tubing – PLGT end fitting

5.2 Tightness

5.2.1 *Requirements*

The initial tightness test shall be performed with the cover in place. For the final tightness test, the cover shall be removed in order that it does not contribute to the achievement of the tightness. The test method is described in Annex A.

5.3 Dimensional Check

5.3.1 *Requirements*

When subjected to the test method, every sample length of pliable tubing shall show no sign of inner diameter restriction. The test method is described in Annex B.

5.4 Bending Performance

5.4.1 *Requirements*

After being bent through 12 cycles PLGT samples shall be leak tight to be tested and there shall be no visible cracks in the cover. The test method is described in Annex C.

5.5 Crushing Resistance

5.5.1 *Requirements*

When tested, the bore size of the pliable tubing shall not be reduced by more than 15 percent of its nominal size, and it shall remain tight. The test method is described in Annex D.

5.6 Stability under Pressure

5.6.1 *Requirements*

When subjected to internal pressure as per Annex E, a PLGT sample shall remain tight when tested in accordance with Annex A. The permanent elongation after the release of the pressure shall not exceed 3 percent.

Table 3 Number of Units and Compliance Criteria for Initial and Subsequent Type Testing

(*Clauses* 5.1.1 *and* 6.1)

Type Test	Nominal Size to be tested	Requirement Clause	Sample type	Quantity	Compliance Criteria
Bending performance	All size	**5.4.1**	1	2	Tightness
Crushing resistance	All size	**5.5.1**	1	4	Tightness, maximum deformation
Stability under pressure	All size	**5.6.1**	1	1	Tightness, elongation level
Wear resistance of outer cover	All size	**5.7.1**	1	1	No full penetration
Structural strength test	All size	**5.8.1**	1	1	Tightness
Impact resistance	All size	**5.9.1**	2	1	Tightness, maximum deformation
Penetration resistance	All size	**5.10.1**	1	1	Tightness, maximum
Resistance to pull out	All size	**5.11.1**	1	1	Tightness
Chemical resistance	All size	**5.12.1**	2	3	Tightness, no detrimental effect

Table 4 Test Sequence Schedule

(*Clause* 5.1.1.1)

Test	Tests to Verify the Characteristics	Test Sequence					Clause
		1	2	3	4	5	
A	Tightness test	A	–	–	–	–	**5.2**
B	Dimensional check	B	–	–	–	–	**5.3**
C	Bending performance	B	A	C	A	–	**5.4**
D	Crushing resistance	B	A	D	A	B	**5.5**
E	Stability under pressure	B	A	E	A	–	**5.6**
F	Wear resistance of outer cover	F	–	–	–	–	**5.7**
G	Structural strength	B	A	G	A	–	**5.8**
H	Impact resistance	B	A	H	A		**5.9**
J	Penetration resistance	B	A	J	A	–	**5.10**
K	Resistance to pullout	B	A	K	A	–	**5.11**
L	Chemical resistance	A	L	A	–	–	**5.12**
EXAMPLE : Test H is preceded by tests B and A and followed by test A.							

5.7 Wear Resistance of Outer Cover

5.7.1 *Requirements*

When subjected to the test the cover shall not be fully penetrated. The test method described in Annex F.

5.8 Structural Strength Test

5.8.1 *Requirements*

When subjected to an internal pressure a PLGT sample shall remain tight when tested in accordance with Annex A.

Elongation of the PLGT sample shall be acceptable and recorded in the test report. The test method is described in Annex G.

5.9 Impact Resistance

5.9.1 *Requirements*

A PLGT sample subject to the test impact of 30 J applied onto its PLGT fittings shall remain tight when tested in accordance with Annex A. The test method is described in Annex H.

5.10 Penetration Resistance

5.10.1 *Requirements*

When subjected to the test method a PLGT sample shall remain tight when tested in accordance with Annex A. The test method is described in Annex J.

5.11 Resistance to Pullout

5.11.1 *Requirements*

When subjected to the test method a PLGT sample shall remain tight. The test method described in Annex K.

5.12 Chemical Resistance

5.12.1 *Requirements*

When subjected to the corrosion tests PLGT samples shall show no visual signs of:

a) blistering or cracking on the pliable tubing cover;
b) corrosion or cracking on the pliable tubing with its cover; and
c) corrosion on the PLGT fittings, which could affect the safe performance of the product.

The PLGT samples shall remain tight when tested in accordance with Annex A.

5.12.1.1 *Household cleaning agent test*

The PLGT sample shall be tested in accordance with Annex L-1 and the procedure given in Annex L-2.

5.12.1.2 *Hydrochloric acid test*

The PLGT sample shall be tested in accordance with Annex L-1 and the procedure given in Annex L-3.

5.12.1.3 *Salt spray test*

The PLGT sample shall be tested in accordance with Annex L-1 and the procedure given in Annex L-4.

6 GENERAL

Initial type testing shall be performed to show conformity with this standard:

a) On first use of this document for the PLGT;
b) At the beginning of the production of a new or modified design of components constituting a part of a PLGT; and
c) At the beginning of a new method of production, where this can affect the stated properties.

6.1 Sampling and Compliance Criteria

Initial type testing shall be performed on samples of PLGT representative of the manufactured types, and shall be chosen at random from either a production lot, or available lots, assemblies representative of the production from the market.

The number and type of samples of PLGT to be tested, the tests and compliance criteria are as given in Table 3.

7 ASSEMBLY AND INSTALLATION INSTRUCTION

7.1 General

Each PLGT shall be accompanied by an installation manual, in the language(s) of the country where the 5 kg/cm² (5 bar) are marketed, giving all necessary information regarding its safe installation and usage together with details of the test(s) that should be used at installation and during its lifetime.

The installation manual shall be written by the manufacturer.

The manufacturer shall include in his documentation and instructions the following minimum information:

7.1.1 Initial type testing shall be performed to show conformity with this standard:

a) Name or identifying mark of the producer;
b) Product designation and its description;
c) Description of the PLGT and their PLGT fittings including connections to other equipment of the gas pipe work;
d) Flow factors (pressure drop, capacity and rate) of the pliable tubing and PLGT fittings;
e) Installation drawings of typical applications;
f) Assembling instructions of the individual parts and components of the PLGT, such as;
g) Necessary installation tools;
h) Cutting and end preparation of the pliable tubing;
j) Method of joining to other equipment in the gas pipe work;
k) Tightening torques; and
m) PLGT plugging fittings.

7.1.2 *General methods of installing PLGTs, such as:*

a) Routing;
b) Vertical pliable tuning runs;
c) Horizontal pliable tubing runs;
d) Concealed sections;
e) Underground sections; and
f) Outdoor installations.

7.1.3 *PLGT specific testing requirements:*

a) Tightness test before commissioning;
b) Method of repair;
c) Correct use of recommended supports;
d) The following warnings;
e) Consider the local application regulations;
f) Related to the limitation of the use of the PLGTs;
g) Related to installation, specifically addressing;
h) Do not install this PLGT unless properly trained; and
j) Do not mix components from differing PLGTs.

And where appropriate:

1) Storage instructions;
2) Method of application of any sealant required; and

3) Individual assembly instructions for any components which are supplied in unassembled condition.

7.2 Marking, Labeling and Packaging

The manufacturer shall provide a visible warning that installation shall be performed by a competent person. This warning shall be provided on the packaging and the installation manual.

Each component of the including packaging shall be marked according to the information specified in **7.3**.

7.3 Marking and Labeling

The manufacturer is responsible for providing marking. Information under shall be:

a) marked on the pliable tubing at intervals of not more than 1 m;

b) permanently fixed to or marked on PLGT fittings; and

c) given on accompanying commercial documents and packaging.

   1)
      i) Name or trademark of the manufacturer;
      ii) Reference to this standard;
      iii) Nominal size DN;
      iv) Maximum working pressure (in kg/cm^2);
      v) Word “gas”; and
      vi) Traceability identification.

   2)
      i) Name or trademark of the manufacturer;
      ii) Nominal size DN; and
      iii) Traceability identification.

   3)
      i) Name or trademark of the manufacturer; and
      ii) Product description : generic name, type, material, dimensions and intended use.

NOTE — Supplementary details are permitted in so far as they do not interfere with the markings (a), (b) and (c) above (for example, certification mark logo).

Table 5 Bend Radius

(*Clauses* 5.4.1 *and* 5.12.1)

DN	Bend Radius (mm)
10	20
12	25
15	25
20	30
25	45
32	60
40	80
50	100

7.4 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

ANNEX A

(*Clauses* 5.2.1, 5.6.1, 5.8.1, 5.9.1, 5.10.1. 5.12.1)

TIGHTNESS TEST

A-1 PROCEDURE

When PLGT assembly filled with air/nitrogen at a pressure of 5 kg/cm^2 (5 bar) is held for 5 min underwater, there shall be no visible bubbles in the entire assembly.

ANNEX B

(*Clauses* 5.3.1 *and* D-1)

DIMENSIONAL CHECK

B-1 PROCEDURE

A metal sphere or gauge, calibrated to (98 + 0/– 0.5) percent of the DN shall pass through the length.

ANNEX C

(*Clause* 5.4.1)

BENDING PERFORMANCE

C-1 PROCEDURE

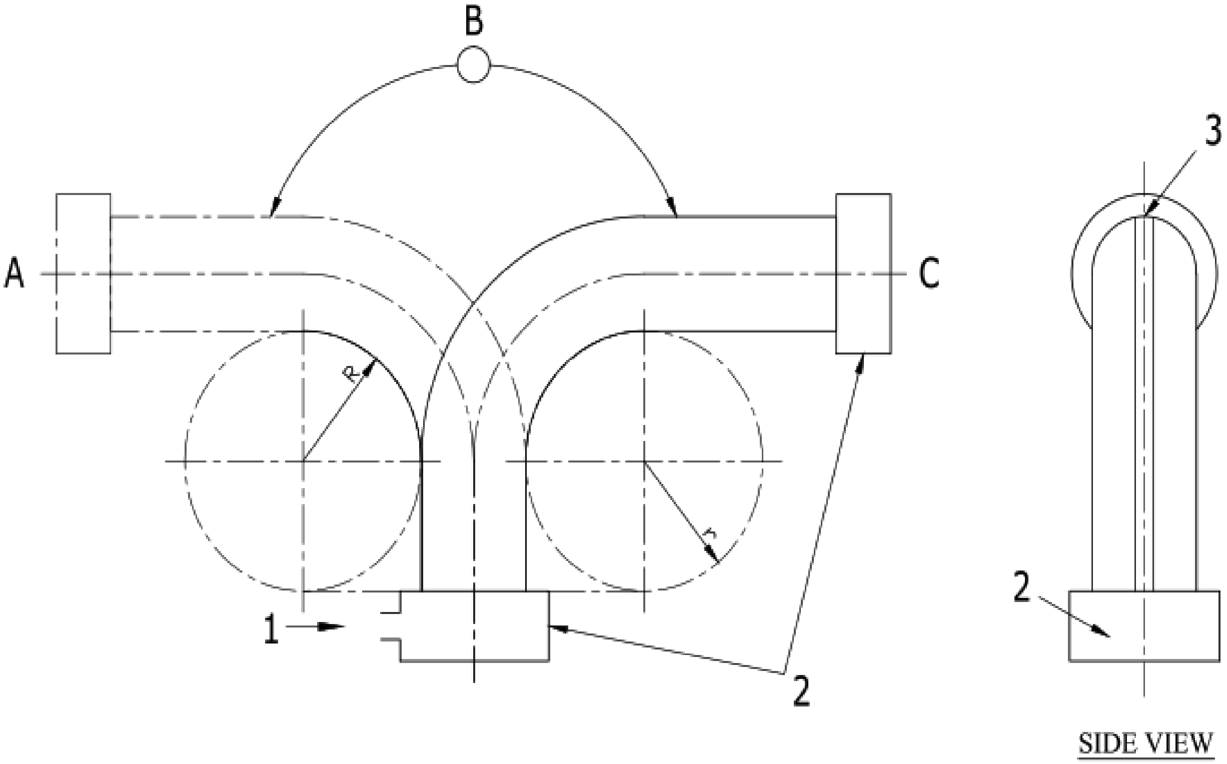
The samples shall be subjected to a bend test as shown in Fig. 4. With one end rigidly fixed, the other shall be moved to a starting position A in a circular arc around a former having a radius calculated from the bend radius (bending test) as given in Table 5, until the tubing is in intimate contact with the full length of the arc of the former.

Throughout the test, the sample shall be pressurized air at the product MOP.

The PLGT sample shall be bent 12 times through an arc of 180°, the first cycle comprises one bend starting in position A moving through B to the end position C, the second cycle being a movement from position C through B to the end position A.

The longitudinal seam weld shall be located in accordance with position 3 (*see* Fig. 4). If helical welding is used, the orientation of the weld shall be ignored.

The test frequency shall be 10 cycles/min +/–2 cycles /min.



KEY

r = Former Radius
R = Bend Radius
1 = Pressure Sensor
2 = End Fittings
3 = Weld Seam Orientation

All dimensions in millimetres

FIG. 4 BENDING TEST CONFIGURATION

ANNEX D

(*Clause* 5.5.1)

CRUSHING RESISTANCE

D-1 PROCEDURE

The internal diameter shall be determined by using the method described in Annex B before the crushing test.

The corrugated part of the PLGT sample shall be placed on a hard flat support surface. A load of 4 000 N shall be gradually applied on a square steel plate of 150 mm side positioned on the PLGT sample. After a stabilization time of 5 min, the load shall be removed.

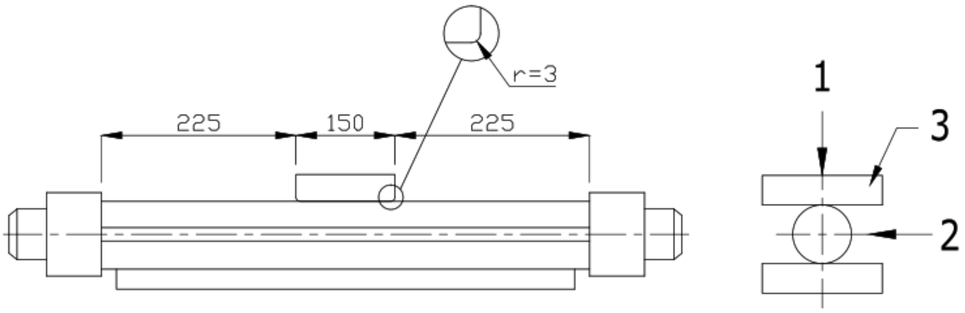
Subject 2 samples of type 1 to a crushing test as shown in Fig. 5.

Subject 2 samples of type 1 to a crushing test as shown in Fig. 6.

The seam of the PLGT sample shall be at right angles to the direction of the load. If helical welding is used, the orientation of the weld shall be ignored.

Carry out the tightness test.

Following the test, the bore size of the pliable tubing shall be confirmed by using the method given in Annex B, but using a sphere or a gauge calibrated to 85 percent (+ 0.0/– 0.5 percent) of that used in the original dimensional test.

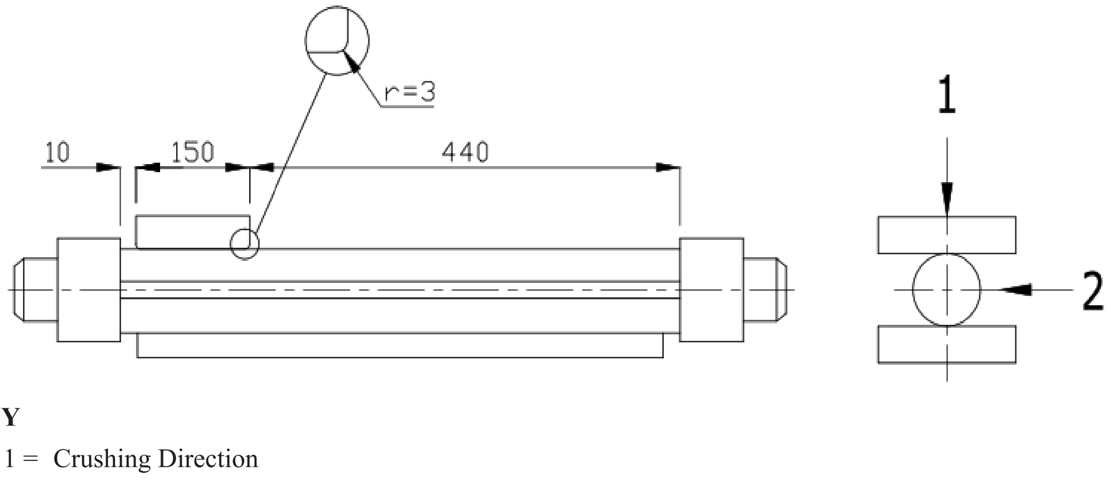


KEY

1 = Crushing Direction
2 = Seam Weld
3 = Steel Plate

All dimensions in millimetres

Fig. 5 Crushing Test Configuration 1



KEY

1 = Crushing Direction
2 = Seam Weld

All dimensions in millimetres

Fig. 6 Crushing Test Configuration 2

ANNEX E

(*Clause* 5.6.1)

STABILITY UNDER PRESSURE

E-1 PROCEDURE

The length of the PLGT sample shall be measured on a flat surface and recorded. With one of its ends free and the other one plugged to a pressure device, the PLGT sample shall be gradually pressurized to the strength test pressure but to a minimum of 5 kg/cm² (5 bar) or higher, as declared by the manufacturer. The pressure shall be maintained for 5 min. Following the release of the pressure, the length shall be re-measured.

ANNEX F

(*Clause* 5.7.1)

WEAR RESISTANCE OF OUTER COVER

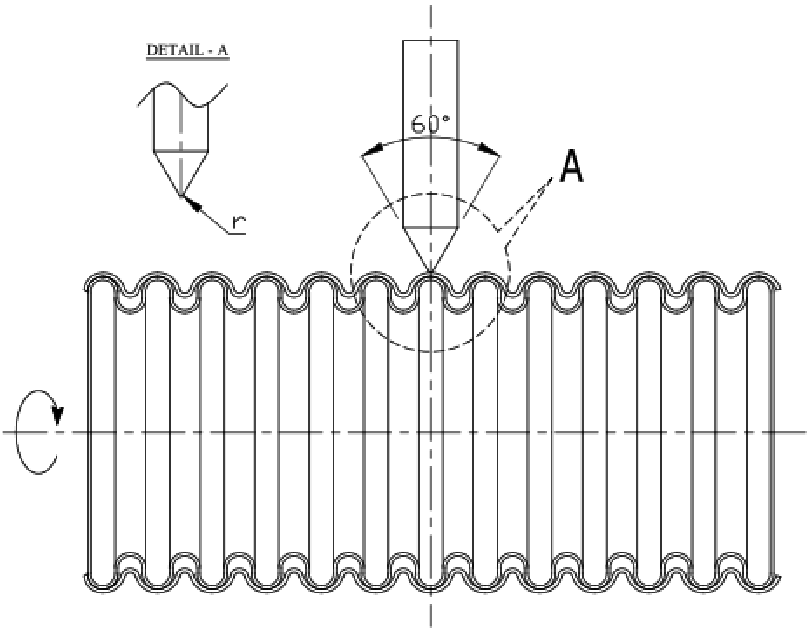
F-1 PROCEDURE

The test method shall consist of:

a) A 100 mm length of pliable tubing with its cover in place shall be mounted between centers and rotated with the crest of a corrugation under the test head (*see* Fig. 7);

b) The apparatus shall be adjusted so as to apply a force of 30 N to the test head, then rotate the tubing through (350° ± 5°) at a surface speed of (35 ± 5) mm/s; and

c) The cover shall be visually examined for penetration.



KEY

r = 0.5 mm

Detail A = Test Head

All dimensions in millimetres

FIG. 7 TEST CONFIGURATION OF WEAR RESISTANCE OUTER COVER

ANNEX G

(*Clause* 5.8.1)

STRUCTURAL STRENGTH TEST

G-1 PROCEDURE

The unrestrained sample is subjected to an internal pressure of 15 kg/cm^2 (15 bar) in a straight position for a period of (300 + 10/– 0) s.

If this test is carried out using water, the sample shall be dried prior to the tightness test.

ANNEX H

(*Clause* 5.9.1)

IMPACT RESISTANCE

H-1 PROCEDURE

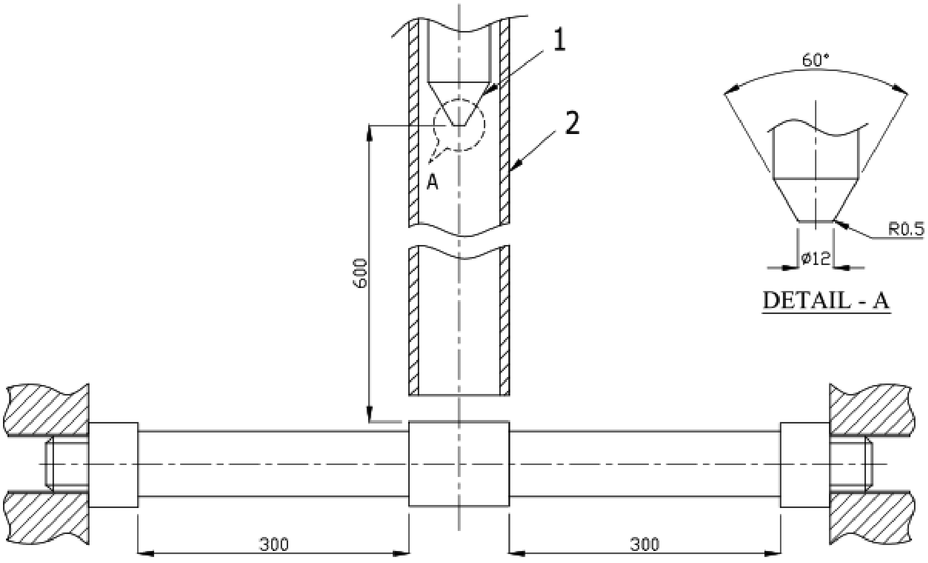
Each PLGT end fitting shall be secured in a fixed support.

The sample is:

a) Held by its end fittings without exerting traction; and

b) Guided so that it remains in the striking axis.

A mass of 5 kg as given in detail A shall be dropped from a height of 600 mm onto the PLGT fittings, *see* Fig. 8.



KEY

1 = Mass

2 = Guide Tube with a Loose Fit

All dimensions in millimetres

FIG. 8 IMPACT TEST

ANNEX J

(*Clause* 5.10.1)

PENETRATION RESISTANCE

J-1 PROCEDURE

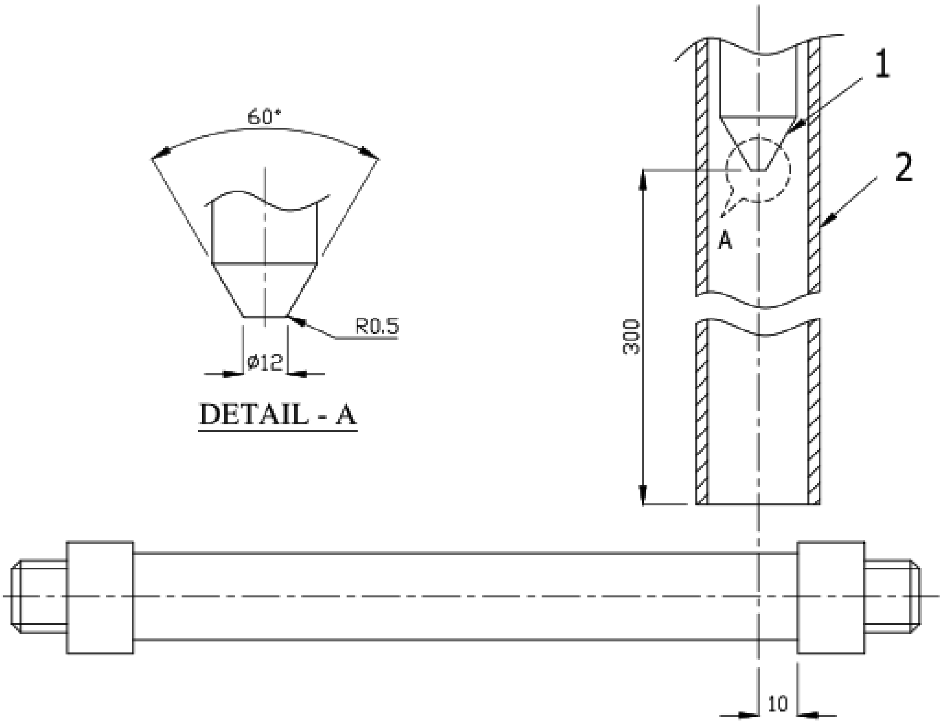
A striker of a mass of 5 kg as given in detail A shall be dropped from a height of 300 mm onto the pliable tubing close to the PLGT fitting (20 mm from its insert into the PLGT fitting or the nut), *see* Fig. 9.

The orientation of the weld seam B of the pliable tubing at the point of impact shall be at right angles to the direction of force.

The sample is:

a) On a hard flat support surface; and

b) Guided so that it remains in the striking axis.



KEY

1 = Striker

2 = Guide Tube with a Loose Fit

All dimensions in millimetres

FIG. 9 PENETRATION RESISTANCE TEST CONFIGURATION

ANNEX K

(*Clause* 5.11.1)

RESISTANCE TO PULL OUT

K-1 PROCEDURE

An axial load of 100 times DN in N (for example, 2 500 N for DN 25) shall be gradually applied to the sample at a rate of 50 N/s to 100 N/s and the full load shall be maintained for 10 min. After release of the load, the sample shall be tested in accordance with Annex A.

ANNEX L

(*Clauses* 5.12.1.1, 5.12.1.2 *and* 5.12.1.3)

CORROSION RESISTANCE

L-1 TEST METHOD

For each test, a PLGT sample shall be bent over a cylindrical former whose diameter is calculated using the bend radius given in Table 5, to obtain a U bend sample as shown in Fig. 10.

The sample shall be partially immersed in the appropriate solution for the specified time.

The sample shall be fitted with sleeves if prescribed by the manufacturer's installation instructions. The instruction manual shall describe the use of these sleeves.

HOUSEHOLD CLEANING AGENT TEST

L-2 PROCEDURE

Rinse slowly, for 10s, a volume of around 100 cm^3 of the test solution over each PLGT fitting (tubing downward).

Immerse the sample in 150 mm of chloric bleach (9 percent by volume sodium hypochlorite) solution at (20 + 1) °C for (72 + 1) h.

Rinse the PLGT sample with deionized water.

Visually inspect the cover.

Remove the cover and visually inspect the pliable tubing over its entire length.

HYDROCHLORIC ACID TEST

L-3 PROCEDURE

Rinse slowly, for 10 s, a volume of around 100 cm^3 of the test solution over each PLGT fitting (tubing downward).

Immerse the sample in 150 mm of Hydrochloric acid (4 percent by volume) solution at (20 + 1) °C for (72 + 1) h.

Rinse the PLGT sample with deionized water.

Visually inspect the cover.

Remove the cover and visually inspect the pliable tubing over its entire length.

SALT SPRAY TEST

L-4 PROCEDURE

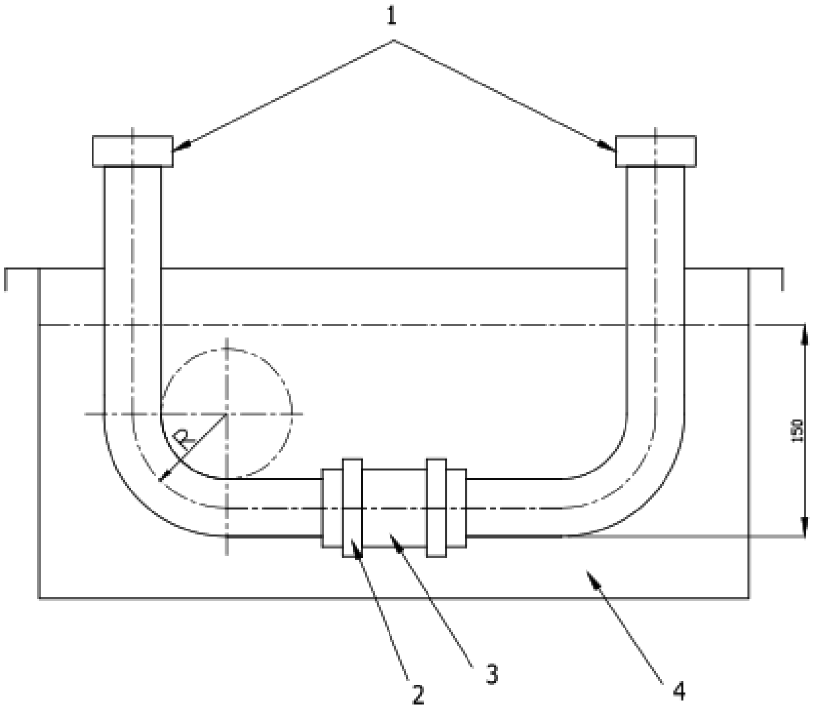
Place the PLGT sample in the salt spray chamber for (96 ± 1) h at (35 ± 1) °C. The intensity of the spray shall be such that, for each 80 cm^2 of the horizontal collecting surface, (2 ± 1) ml of solution are collected per hour.

Solution type; Salty environment : 5 percent ± 0.5 percent mass concentration sodium chloride diluted in distilled water.

Rinse the PLGT sample with deionized water.

Visually inspect the cover.

Remove the cover and visually inspect the pliable tubing over its entire length.



KEY

1 = Plugged End Fitting
2 = Sleeve (if Prescribed)
3 = Coupling
4 = Test Solutions, Given in Table 4 and 5
R = Bend Radius

All dimensions in millimetres

FIG. 10 CHEMICAL RESISTANCE TEST CONFIGURATION

ANNEX M

(*Foreword*)

COMMITTEE COMPOSITION

Composition of Domestic and Commercial Gas Burning Appliances (Pressure Type)
Sectional Committee, MED 23

Organization	*Representative(s)*
L P G Equipment Research Centre, Bengaluru	Shri Ashish Bera (***Chairman***)
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BSH Household Appliances Manufacturing Private Limited, Chennai	Shri Vijay Kumar Loganathan
Bharat Petroleum Corporation Limited, Mumbai	Shri Sudipta Sarkar Shri Mohit Rane (*Alternate*)
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Superflame Enterprises Private Limited, Faridabad	Shri Vikram Verma

Organization	*Representative(s)*
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In Personal Capacity S-139, Greater Kailash-I (1st & 2nd Floor), New Delhi - 110048	Shri M. K. Gupta
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